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Life Science students' expectations on the importance and impact of education on personal development and career

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Abstract

The aim of the study was to determine the students' expectations before and after MSc and teachers' perception of the educational process from the perspective of developing employment opportunities. Questionnaires were applied to master students and teachers from the Faculty of Biology. For master students, the results pointed out a statistically significant decrease of their expectations for the items Easiness in finding a job, Well-paid job, Need for Knowledge, Involvement in research and development, before and after MSc. The assessment of the teachers' perception reveals that education has a small role regarding finding a job with an appropriate salary.

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1. Paper Rationale

To decrease unemployment among young people, education and research can be used as personal and economic development stimuli. In this respect, it is imperative to evaluate the educational activity from the perspective of perception of training in universities as an opportunity for future employment. Identifying the perception of key

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stakeholders of the status quo is a prerequisite for highlighting their opinion on the role of education and research in ensuring a high employment rate among graduates with appropriate salary or the ability to produce new jobs.

Due to the difficulties in analyzing the economic environment, we have investigated the perceptions of master students and teachers in terms of economic impact and employment based on the graduates' competencies.

2. Paper theoretical foundation and related literature

Due to a more pronounced tendency to develop an economy based on technological innovation and cognitive transfers, the need to identify, develop and implement the necessary skills needed in order to adapt to a increasingly competitive global economic environment has emerged. Higher education can respond to the need of social, cultural and economic development by supporting fundamental research, applied research and technology transfer.

The link between higher education and innovation is indicated by numerous studies showing the positive relationship between high levels of education and economic growth, measured by variables such as research and development, graduates' employment rate, the science test scores, the number of engineers and scientists per capita (Laursen & Salter, 2004; Lederman & Maloney, 2003).

A World Bank report from 2012 shows that USA college graduates earn, on average, 17% more than high school graduates and consume from the budget of social programs less than 800 - 2,700 \$ compared to high school graduates (The World Bank, 2012). The same report identifies various discrepancies in the tertiary education system that limit social impact including differences between the skills acquired by graduates and the needs of the employers, differences between assigned financial resources in universities and the private sector, the lack of a connection between teaching and research activities and the lack of feedback between higher education institutions and secondary schools. These concerns were identified also in the Romanian universities (Korka, 2009).

World Bank recommends linking the skills required by companies with higher education and a closer collaboration between universities and the industry to develop curricula. Besides methods used by industrial practice, employees of higher education institutions should establish mechanisms to collaborate with the industry and prioritize programs such as internship mechanism for encouraging workplace learning and curriculum development (Potolea, Toma, & Mosoiu, 2011).

The European Union adopted the "European program of key competences for lifelong learning" with the purpose to develop curricula at all education levels. The key competences necessary for the social inclusion of European citizens and the competences required to be employed in a knowledge-based economy were identified in this framework (British Council, 2007).

In EU policies, developing research infrastructure plays a decisive role in stimulating research and innovation capacity, and increasing the collaboration between business, research and society will lead to the development of centers of excellence (Baneth & Cserey, 2008). Research and development EU policies were integrated in Romania's national strategy by supporting research projects through competitions on different levels, starting from the partnerships between universities and the industry representatives and up to programs of excellence in Human Resources (ANCSI 2015). The evaluation of these projects is done similar to European FP7 projects, assessing the quality of scientific and technical project proposals, the potential impact and dissemination of results, the quality of research consortia as well as project management, methodology, work plan and budget. These will provide a basis for curriculum assessment needed in order to identify skills required to stimulate creativity and innovation and create new jobs.

In this challenging context, the mission of education and research is to diminish the differences between the capacity of the Romanian labor market to attract highly qualified graduates towards research and innovation compared to the rest of Europe.

3. Methodology

Questionnaires were applied to Medical Biology and Biochemistry master students (54 respondents) and teachers (17 respondents) from the Faculty of Biology, University of Bucharest. These aimed to assess their perception of the educational process from the perspective of developing employment opportunities.

Master students' perception was investigated using the following items: Easiness in finding a job (Item 1), Well-paid job (Item 2), Need for knowledge (Item 3), Involvement in research and development (Item 4), Spin-off development (Item 5). The assessment was conducted using a Likert scale: to a very small extent, to a small extent, to a moderate extent, to a great extent, to a very great extent. Before the graduation exam in 2014, MSc students were asked to express what expectations they had prior to the enrollment in a master program and to what extent their expectations have been materialized. The questionnaire consists of two parts and each part has 5 items that evaluate their perception before and after graduating MSc.

The perception of teachers was investigated using the following items:

- Identifying their role in the institution (Item 1);
- Education output quantified in the ability of graduates to quickly be integrated into the labor market with a salary corresponding to those in other countries (Item 2);
- Education output quantified in the ability of graduates to find a research position in a private company (Item 3); Education output quantified in the ability of graduates to find a research position in a university or research institute funded from the budget (Item 4);
- Education and research have the potential to stimulate the development of new well-paid jobs (Item 5).

The evaluation was conducted using Likert scale:

- To a very small extent,
- To a small extent,
- To a moderate extent,
- To a great extent,
- To a very great extent.

However, for Item 1 (Identifying their role in the institution) the following possible answers were given:

- Researcher involved in the projects of others,
- Researcher who endeavors to develop his own projects,
- Teacher who makes efforts to integrate students into research,
- Employee of a company with research activities,
- Manager in a company with research activities,
- Open answer.

Likert Scale was converted into numerical values from 1 to 5. For statistical analysis SPSS 20 was used.

4. Results

The evaluation results of students' expectations were centralized in Table 1 and Figure 1.

Table 1. Mean Likert Score +/- SD (n=54) of students' expectations.

| Items | Mean score before MSc | SD | Mean score after MSc | SD |
|---|-----------------------|-------|----------------------|-------|
| Easiness in finding a job | 3.94 | 0.148 | 3.65 | 0.133 |
| Well-paid job | 3.76 | 0.121 | 3.54 | 0.101 |
| Need for knowledge | 4.39 | 0.081 | 3.94 | 0.11 |
| Involvement in research and development | 3.98 | 0.139 | 3.56 | 0.162 |
| Spin-off development | 2.83 | 0.197 | 2.7 | 0.186 |

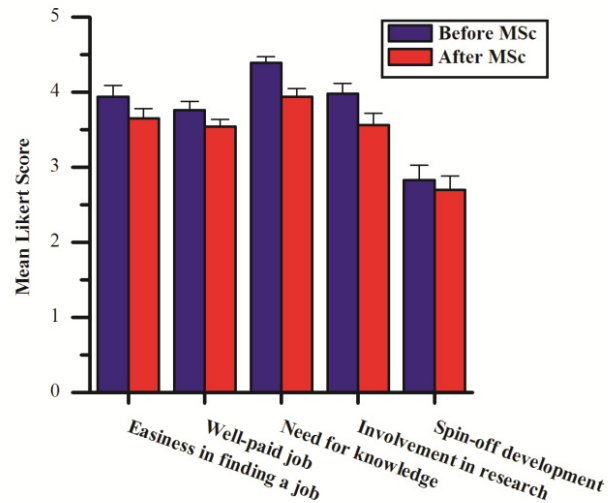


Fig. 1. Comparison of students' expectations before and after MSc
The graph represents mean +/- SD (n=54).

Cronbach's alpha for all items of 0.790 confirms internal test validity. Wilcoxon Signer Ranks Test shows a statistically significant decrease ($p < 0.01$) for items Easiness in finding a job, Well-paid job, Need for knowledge, Involvement in research and development. For the item Spin-off development, before and after MSc, the differences were not statistically significant.

The evaluation of teachers' perception were centralized in Table 2 and Figure 2.

The small number of responses, received from teachers, does not allow responses stratification based on Item 1. Cronbach's alpha value computed for Items 2-5 is 0.508 which indicates a poor internal consistency.

Normal data distribution was established using Kolmogorov-Smirnov One-Sample Test ($p > 0.05$) for the items:

- Education output quantified in the ability of graduates to quickly be integrated into the labor market with a salary corresponding to those in other countries (Item 2);
- Education output quantified in the ability of graduates to find a research position in a private company (Item 3);
- Education output quantified in the ability of graduates to find a research position in a university or research institute funded from the budget (Item 4);
- Education and research have the potential to stimulate the development of new well-paid jobs (Item 5).

Table 2 Descriptive statistics of teachers' perception (n=17)

| | Mean | SD | Kurtosis | Skewness |
|--------|------|-------|----------|----------|
| Item 2 | 2.12 | 0.928 | -0.779 | 0.276 |
| Item 3 | 2.18 | 1.015 | -1.442 | 0.013 |
| Item 4 | 2.53 | 0.717 | 0.155 | -0.115 |
| Item 5 | 1.94 | 0.899 | -1.843 | 0.125 |

For Items 3 to 5, Kurtosis values highlight that responses are influenced by the individual characteristics of respondents. Skewness coefficient emphasizes that there is a relative symmetrical distribution of responses without difficulty in achieving the objective.

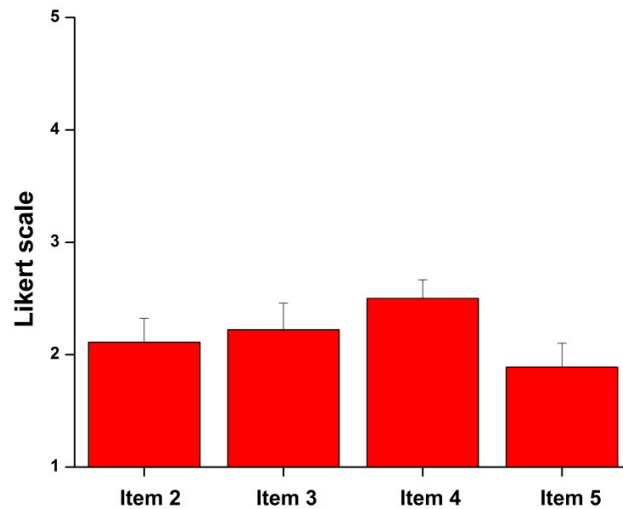


Fig. 2. Teachers' perception regarding the capacity of the higher education system to develop new and well-paid jobs.

The graph represents mean \pm SEM ($n=17$).

5. Discussions

The results have been outlined on two levels and pointed out the perception of teachers regarding the capacity of the higher education system to develop new and well-paid jobs and the expectations of MSc students after graduation.

For master students, the analysis revealed a statistically significant decrease of their expectations for the items Easiness in finding a job, Well-paid job, Need for Knowledge, Involvement in research and development, before and after MSc. There were no statistically significant differences for the item Spin-off development, before and after MSc.

MSc students consider that Need for knowledge is more important than Spin-off development, a fact which may be correlated with the small number of projects developed by students.

The assessment of the teachers' perception indicates that education has a small role when it comes in finding a job with an appropriate salary in a private institution or research institutes. It also shows that education and research play a small part in fostering the development of new jobs. The teachers' perception of the ability of graduates to be employed in a private company and the ability to stimulate the development of new well-paid jobs is dependent on individual characteristics as highlighted by the Kurtosis coefficient. Some teachers give more importance to these two features of education which represent a positive prognostic factor.

The majority of master students already have a job, which could explain why expectations are focused more on the need for knowledge. Students are least interested in developing a spin-off and this may be related to the inability of the educational system and implicitly of teachers to develop among students innovation skills. In this regard, it is necessary to re-construct the whole educational system by developing a new curriculum that includes elements of creativity and innovation in a manner open to new ideas and new technologies development by students.

This effort to develop new technologies requires a flexible curriculum able to stimulate innovation capabilities by redefining desirable state.

Teachers must engage students in their own research in order to develop practical laboratory skills. Even though there is a degree of students' involvement in laboratory activities, the results of this study point to the fact that students are not so interested in developing spin-offs. This may be explained by the lack of a positive example among teachers or scientific researchers. The solution can be the fostering of students in generating new ideas, critical thinking, flexibility and fluency in thinking.

The need to stimulate students to think *out of the box* requires the existence of a flexible environment in which the teacher want to change from a provider of knowledge and skills into a mentor, whose primary purpose is to lead students to surpass the teacher.

6. Conclusions

Students feel some degree of disappointment at graduation because their initial expectations have not been met.

The MSc students and teachers' expectations converge towards a relatively negative assessment of the educational process. This leads to the necessity to improve the education in universities in order to increase the employment rate of young people with a salary proportional with their professional qualifications and who can have a long-term impact on the socio-economic development.

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